

1 CLAIMS

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3 WHAT IS CLAIMED IS:

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5 1. A method for a diversified host based route selection
6 metric, the method comprising:

7 using a diversified route profile table to measure a
8 breadth of use and frequency of use for routes in a routing
9 cache.

10

11 2. The method of claim 1, wherein data collected in the
12 table is used by an analyzer to rank the routes.

13

14 3. The method of claim 1, wherein the rank of the routes
15 is used by a route selection algorithm to determine which
16 routes in a routing table should be programmed into a
17 network route cache.

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19 4. The method of claim 1, wherein the routing cache
20 comprises a network route cache and a host route cache.

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22 5. The method of claim 4, wherein the use of the network
23 routing cache is optimized such that routes that are not

1 used to route to a large number of destinations can be
2 offloaded into the host route cache.

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4 6. The method of claim 4, wherein the use of the network
5 routing cache is optimized such that routes that are used
6 to route to a large number of destinations are stored in
7 the network routing cache.

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9 7. The method of claim 1, further comprising:
10 using a set of IP addresses that appear in a profile
11 table, over a sampling period to measure the value of
12 maintaining each route in a route cache.

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14 8. The method of claim 7, wherein the route cache is a
15 routing table that only contains a subset of all the routes
16 that are known by the router knows.

17

18 9. The method of claim 1, further comprising:
19 assigning each route, in a route cache, a unique
20 identifier that can be inserted into a recorded data for
21 each address that is programmed into the profile table, in
22 order to improve the efficiency of evaluating routes in the
23 routing cache.

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1 10. The method of claim 1, further comprising:
2 using a programmable hash function to generate the
3 hash value hash(Pkt.daIP).

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5 11. The method of claim 1, further comprising:
6 varying a hash function that is used between sampling
7 periods for the same route set in order to improve the
8 quality of the data that is collected.

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10 12. The method of claim 1, further comprising:
11 shortening the time of the sampling period in order to
12 obtain a more complete list of IP addresses that are using
13 a particular set of routes.

14

15 13. The method of claim 12, wherein if the time of the
16 sampling period is shortened to correspond to the length of
17 time that it takes to transmit a single packet, then a
18 complete list of all IP addresses that are using a
19 particular set of routes can be generated.

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21 14. The method of claim 1, further comprising:
22 adding a counter to each hash entry in a profile
23 table, where the counter will be incremented for each time
24 that a hash entry is written to.

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2 15. The method of claim 1, further comprising:
3 adding a counter for each hash entry in a profile
4 table, where the counter will be incremented every time the
5 hash entry is written with the same IP address and is reset
6 every time the entry is written with a new IP address.

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8 16. The method of claim 1, further comprising:
9 using a list instead of a hash for profiling route
10 breadth and frequency.

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12 17. The method of claim 1, further comprising:
13 using different inputs to a profiler other than the
14 destination address of packets.

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16 18. The method of claim 17, wherein the different inputs
17 are used to measure the breadth and frequency of flows as
18 well as host routes.

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20 19. The method of claim 1, further comprising:
21 identifying routes by use of suitable identifier
22 technique.

23

1 20. A method for evaluating the suitability of routes for
2 use in a routing cache, the method comprising:
3 using an array indexed by a value, hash(Pkt.daIP), and
4 written to with a packet destination address, Pkt.daIP, to
5 profile the width and breadth of use for routes in a
6 routing table.

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8 21. The method of claim 20, wherein the hash() value may
9 be any suitable function.

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11 22. The method of claim 20, further comprising:
12 using profile control bits to control the profiling of
13 routes for use in the diversified host route selection
14 metric.

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16 23. A method for a diversified host based route selection
17 metric, the method comprising:
18 using a route profiler that groups routes into profile
19 sets such that each profile sets standard deviation of
20 value is minimized.

21

22 24. An apparatus for a diversified host based route
23 selection metric, the apparatus comprising:

1 a route profiler configured to use a diversified host
2 route metric hash to measure a breadth of use and frequency
3 of use for routes in a routing cache.

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5 25. The apparatus of claim 24, wherein the breadth of use
6 and frequency of use are used by an analyzer to rank the
7 routes.

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9 26. The apparatus of claim 24, wherein the rank of the
10 routes is used by a route selection algorithm to determine
11 which routes in a routing table should be programmed into a
12 network route cache.

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14 27. The apparatus of claim 24, wherein the routing cache
15 comprises a network route cache and a host route cache.

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17 28. The apparatus of claim 24, wherein the use of the
18 network routing cache is optimized such that routes that
19 are not used to route to a large number of destinations can
20 be offloaded into the host route cache.

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22 29. The apparatus of claim 24, wherein the use of the
23 network routing cache is optimized such that routes that

1 are used to route to a large number of destinations are
2 stored in the network routing cache.

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4 30. The apparatus of claim 24 wherein the route profiler
5 is configured to use a set of IP addresses that appear in a
6 profile table, over a sampling period to measure the value
7 of maintaining each route in a route cache.

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9 31. The apparatus of claim 30, wherein the route cache is
10 a routing table that only contains a subset of all the
11 routes that are known by the router.

12

13 32. The apparatus of claim 24, wherein the route profiler
14 is configured to assign each route, in a route cache, a
15 unique identifier that can be inserted into a recorded data
16 for each address that is programmed into a programmable
17 hash function, in order to improve the efficiency of
18 evaluating routes in the routing cache.

19

20 33. The apparatus of claim 24, wherein the route profiler
21 is configured to use a programmable hash function to
22 generate the hash value $\text{hash}(\text{Pkt.daIP})$.

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1 34. The apparatus of claim 24, wherein the route profiler
2 is configured to vary a hash function that is used between
3 successive sampling periods for the same route set in order
4 to improve the quality of the data that is collected.

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6 35. The apparatus of claim 24, wherein the route profiler
7 is configured to shorten the time of the sampling period in
8 order to obtain a more complete list of IP addresses that
9 are using a particular set of routes.

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11 36. The apparatus of claim 24, wherein if the time of the
12 sampling period is shortened to correspond to the length of
13 time that it takes to transmit a single packet, then a
14 complete list of all IP addresses that are using a
15 particular set of routes can be generated.

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17 37. The apparatus of claim 24, wherein the route profiler
18 further comprises:

19 a counter to each hash entry in a profile table, where
20 the counter will be incremented for each time that a hash
21 entry is written to.

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23 38. The apparatus of claim 24, wherein the route profiler
24 further comprises:

1 a counter for each hash entry in a profile table,
2 where the counter will be incremented every time the hash
3 entry is written with the same IP address and is reset
4 every time the entry is written with a new IP address.

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6 39. The apparatus of claim 24, wherein the route profiler
7 is configured to use a list instead of a hash for profiling
8 route breadth and frequency.

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10 40. The apparatus of claim 24, wherein the route profiler
11 is configured to use different inputs other than the
12 destination address of packets.

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14 41. The apparatus of claim 24, wherein the different
15 inputs are used to measure the breadth and frequency of
16 flows as well as host routes.

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18 42. The apparatus of claim 24, wherein the route profiler
19 is configured to identify routes by use of suitable
20 identifier technique.

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22 43. An apparatus for evaluating the suitability of routes
23 for use in a routing cache, apparatus comprising:

1 a route profiler configured to use an array indexed by
2 a value, hash(Pkt.daIP), and written to with a packet
3 destination address, Pkt.daIP, to profile the width and
4 breadth of use for routes in a routing table.

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6 44. The apparatus of claim 43, wherein the hash() function
7 may be any suitable function.

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9 45. The apparatus of claim 43, wherein the route profiler
10 is configured to use profile control bits to control the
11 profiling of routes for use in the diversified host route
12 selection metric.

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14 46. An apparatus for a diversified host based route
15 selection metric, the apparatus comprising:

16 a profiler configured to group routes into profile sets
17 such that each profile sets standard deviation of value is
18 minimized.

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20 47. An apparatus for a diversified host based route
21 selection metric, the apparatus comprising:

22 means for using a diversified route profile table to
23 measure a breadth of use and frequency of use for routes in
24 a routing cache.

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2 48. An article of manufacture, comprising:

3 a machine-readable medium having stored thereon

4 instructions to:

5 use a diversified route profile table to measure a

6 breadth of use and frequency of use for routes in a routing

7 cache.